

CLAIMS

What is claimed is:

1. A self-RAID (Redundant Array of Inexpensive Disks) system, the self-RAID system comprising:
 - a hard disk drive with at least one writable and readable disk medium;
 - a spindle motor rotating the at least one disk medium;
 - a plurality of heads;
 - an actuator arm driving the heads; and
 - a controller controlling the heads to write data to and read data from the at least one disk medium using a mode selection signal,wherein the controller examines the mode selection signal, controls a first head and a second head of the plurality of heads to write the same data to and read the same data from the at least one disk medium when the hard disk drive operates under a self-RAID mode, and controls the first head and the second head of the plurality of heads head to write different data to and read different data from the at least one disk medium when the hard disk drive operates under a normal mode.
2. The self-RAID system according to claim 1, wherein the first head and the second head are positioned on opposite sides of one disk medium and oppose each other.
3. The self-RAID system according to claim 1, wherein the first head is positioned on a first one of the at least one disk medium and the second head is positioned on a second one of the at least one disk medium.
4. The self-RAID system according to claim 1, wherein the first head is a primary head and the second head is a backup head.
5. The self-RAID system according to claim 4, wherein the controller is a microcontroller controlled by firmware, and during a data write operation, the backup head writes data written by the primary head to a backup position that is different from a write position to which the primary head writes data whereas during a data read operation, if the primary head cannot read data written to the write position, the backup head reads data written to the backup position and the primary head rewrites read data in another write position.

6. The self-RAID system according to claim 5, wherein the controller provides a user with information about a malfunction of the primary head and the backup head and defects of the disk-shaped medium, in response to a user request.

7. A method of writing data to and reading data from a hard disk drive, the method comprising:

writing the same data to a write position and a backup position using a primary head and a backup head;

reading the data using the primary head, wherein the data is read by the backup head if the primary head cannot read the data after a predetermined time; and

restoring the data read by the backup head to the write position using the primary head.

8. The method according to claim 7, further comprising:

examining a mode selection signal before the writing of the same data and the reading the data; and

writing and reading different data using the primary head and the backup head if the hard disk drive operates under a normal mode.

9. The method according to claim 8, wherein the writing the data comprises:

writing the data to the write position using the primary head, and

writing the data written by the primary head to the backup position that is different from the write position using the backup head.

10. The method according to claim 9, wherein the writing the data to the write position comprises:

determining whether the data has been successfully written, and

rewriting the data to another write position that is different from the write position after a predetermined time if the writing the data has not been successfully performed.

11. The method according to claim 9, wherein the writing the data written by the primary head to the back up position comprises:

determining whether the data has been successfully rewritten, and
informing a user of a malfunction of the head used to write data in response to a user request and if the rewrite of the data has failed.

12. The method according to claim 9, wherein the reading of the data comprises:
reading the data using the primary head;
determining whether the data has been successfully read;
rewriting and providing the read data if the data has been successfully read by using the primary head.

13. The method according to claim 12, further comprising:
determining whether the primary head has experienced a malfunction after a predetermined time if the data has not been successfully read using the primary head;
informing the user of the malfunction of the primary head in response to the user request;
reading the data using the backup head; and
informing of a malfunction providing the read data if the data has been successfully read using the backup head.

14. The method according to claim 13, further comprising:
determining whether the backup head has experienced a malfunction after a predetermined time if the data has not been successfully read using the backup head; and
informing the user of the malfunction of the backup head in response to the user's request.

15. The method according to claim 12, wherein the restoring of the data comprises:
restoring the data that has been successfully read by the backup head to the write position using the primary head;
determining whether restoration of the data has been successfully performed;
re-restoring the data to another write position that is different from the write position if restoration of the data has failed; and
determining whether the primary head has experienced a malfunction and informing the user of the malfunction of the primary head in response to a user request.

16. A computer-readable medium encoded with processing instructions implementing a method of writing data to, and reading data from, a hard disk drive, the method comprising:
writing the same data to a write position and a backup position using a backup head;
reading the data using the primary head, wherein the data is read by the backup head if the primary head cannot read the data after a predetermined time; and
restoring the data read by the backup head to the write position using the primary head.

17. A self-RAID (Redundant Array of Inexpensive Disks) system, comprising:
a spindle motor;
a first head and a second head;
an actuator arm driving the heads; and
a controller controlling the heads to write and read data according to a mode selection signal,
wherein the controller controls the first head and the second head to write and read the same data when the mode selection signal indicates a self-RAID mode, and controls the first head and the second head to write and read different data when the mode selection signal indicates a normal mode.

18. The self-RAID system according to claim 17, wherein the first head is a primary head and the second head is a backup head.

19. The self-RAID system according to claim 17, wherein the first and the second heads are positioned above and below one disk medium and oppose each other.

20. The self-RAID system according to claim 19, wherein the second head writes data, written by the first head, to a second position that is different from a first position to which the first head writes data, and during a data read operation, if the first head cannot read data written to the first position, after a predetermined time the second head reads data written to the second position and the first head rewrites the read data in another write position.

21. A method of writing data to a hard disk having a primary head and a backup head, comprising:

- detecting a write position to which the primary head writes the data;
- writing the data to the detected write position;
- storing the data in a temporary memory;
- detecting a backup position to which the backup head writes the data; and
- writing the stored data to the detected backup position.

22. The method according to claim 21, wherein the detecting the backup position comprises detecting a backup position to which the backup head writes the data only if the amount of stored data is less than a predetermined value.

23. The method according to claim 21, further comprising:
upon unsuccessful data writing to the detected backup position, redetecting another write position; and
rewriting the data to the re-detected write position.

24. The method according to claim 23, further comprising storing the data in the temporary memory if the data is rewritten to the redetected write position.

25. The method according to claim 23, further comprising if the data is not rewritten to the redetected write position, informing a user of a head malfunction after a predetermined time;

- detecting backup position to which the backup head writes the data; and
- writing the stored data to the detected backup position.

26. A method of reading data from a hard disk having a primary head and a backup head, comprising:

- detecting a write position to which a primary head has written the data;
- reading the data from the detected write position using the primary head;
- detecting a backup position to which a backup head has written the data after a predetermined time, if the data is not read from the primary head; and
- reading the data from the detected backup position using the backup head.

27. The method according to claim 26, further comprising:
informing a control unit of a malfunction of the primary head and the backup head upon the data not read from the backup position after a predetermined time.

28. The method according to claim 27, further comprising restoring the data to the write position using the primary head.

29. The method according to claim 28, further comprising:
if the data is not restored, determining if the primary head has experience a temporary malfunction; and
re-detecting another write position if no temporary malfunction is detected or information the control unit of the temporary malfunction if the malfunction is detected.